AN INTERESTING LIPARIS PRESENCE AND ITS ECOLOGICAL SIGNIFICANCE ON LAKE VELENCEI/HUNGARY

by

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Till the end of the sixties – mainly after the works of Á. B o r o s – we have known Lake Velencei as a (large lowland) natron lake. Then on one of the lake's small sudd, in the vicinity of the Dinnyés-shore a very rare orchid: the Liparis loeselii and a rich marshy vegetation were found (B a l o g h 1969). This has been evaluated then as a local anomaly of the natron lake (B o r h i d i – B a l o g h 1970). Afterwards B a l o g h (1971) regarded it as a relict of the marshy vegetation existed prior to the large drainage and the salinization following it. (Lake Velencei was as lately as a century ago twice as big as it is today, its drainage was completed in the twenties of this century. Figure 1 illustrates the largest extension of the lake.)

The following botanical discoveries (K i s s – B o r h i d i – V a j d a 1973, B a l o g h 1978, B a k a l á r – B a l o g h 1979) all support the relict-theory. On their basis a picture evolved namely, that the closed sudd-world of the lake's western basin preserves the relicts of the primordial marshy vegetation, the large open waters however sodified and so did the smaller and larger sudds in them, – thus a natron marshy vegetation developed there (B a l o g h 1978a).

On the 13 th July, 1979 in the Lángi clearing – in the sudd-area amidst the Lángi clearing, the Hosszú clearing and the Nagy pond – Rigya, – in the course of the phytocenological mapping of the natron sudd reeds we observed a very interesting phenomenon. Behind the sodified fringe of the sudd, the reed-bed becomes more and more ruch in vegetation, the *Scutellaria galericulata*, the *Mentha aquatica*, the *Calamagrostis canescens*, the *Carex pseudocyperus* and finally – to our greatest surprise – the *Liparis loeselii* appears! (Figure 2).

Examining the zonation of the sudd (Figure 3) we can establish the following:

– the fringe of the sudd, which adjoins directly the saline water of the Lángi clearing, has a very straggling vegetation. The individual number

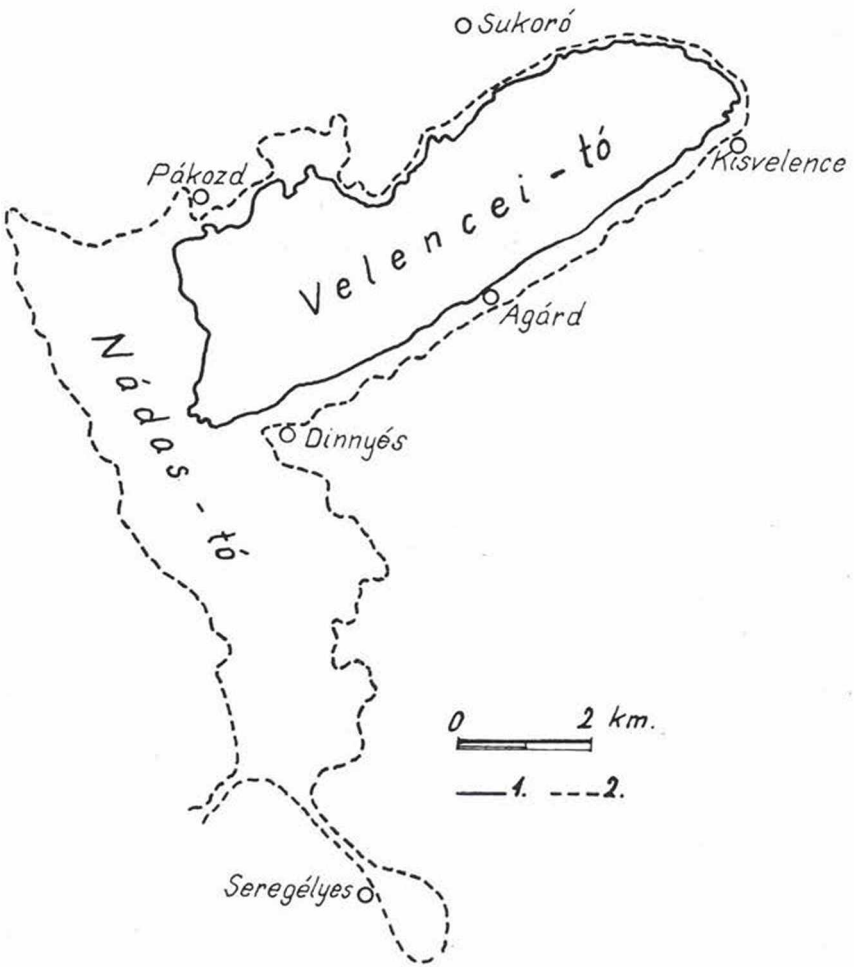

Fig. 1. Largest former (broken line) and present (unbroken line) extension of Lake Velencei/ Hungary

of the plants accompanying the reeds is very low. (This reed-zone – not counting the *Calystegia*, – is practically empty. The saline character of the reeds is often indicated not by the saline marshy plants, but by the absence of the herb layer. This means also that the salinization dates from very recently; the marshy herb layer became exterminated, but the saline plants are just in settling.) The marginal zone is not more than two – three meters wide.

– leaving the fringe there is a reed-bed which has a much richer vegetation consisting of many *Eupatorium cannabium*, *Solanum dulcamara*, *Lycopus europaeus* etc. These reeds, which are at first sight physiognomically very rich in the single cenological surveys are richer in species, in

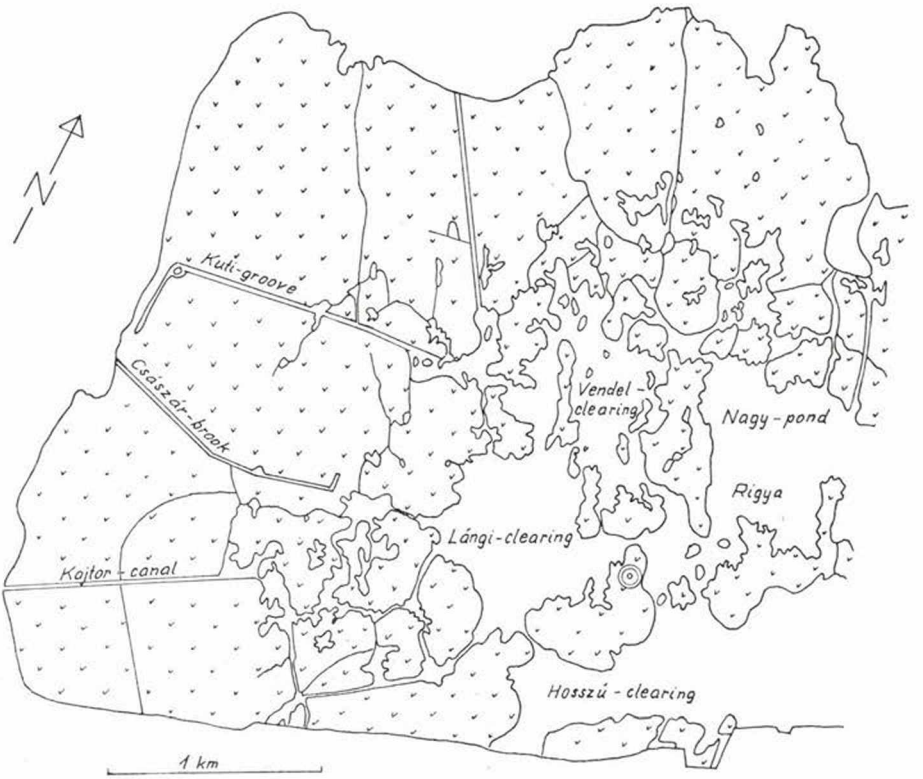

Fig. 2. Map of the western basin of Lake Velencei (Hungary) indicating the new *Liparis* locality

its entirety, however, it is poorer in species than the "empty" reeds on the fringe (see Table I).

– finally, farther off from the fringe in the reeds of rich vegetation not only the number of the individual but also the species increases, with the appearance of the marshy plants a marshy reed-spot develops, what is very peculiar in comparison to its environs. (This is however very far from being so rich as the reeds of the closed sudds. Many more common plants are absent, as for example the *Stachys palutris*, *Thelypteris palustris*, the *Epilobium* species, *Lysimachia vulgaris* etc. On the other hand the *Carex pseudocyperus*, the *Calamagrostis canescens* and the *Liparis* indicate unequivocally that we have to do with a surviving relict of this association in the gradually sodifying water.)

– within the marshy reed-zone we found a very interesting spot. On the surface of the sudd a 30 – 40 cm deep water layer stood, with the reed growing in tussocks. Among them only few bulrushes occured. In the water (respectively with the end of the summer, after longer dry period

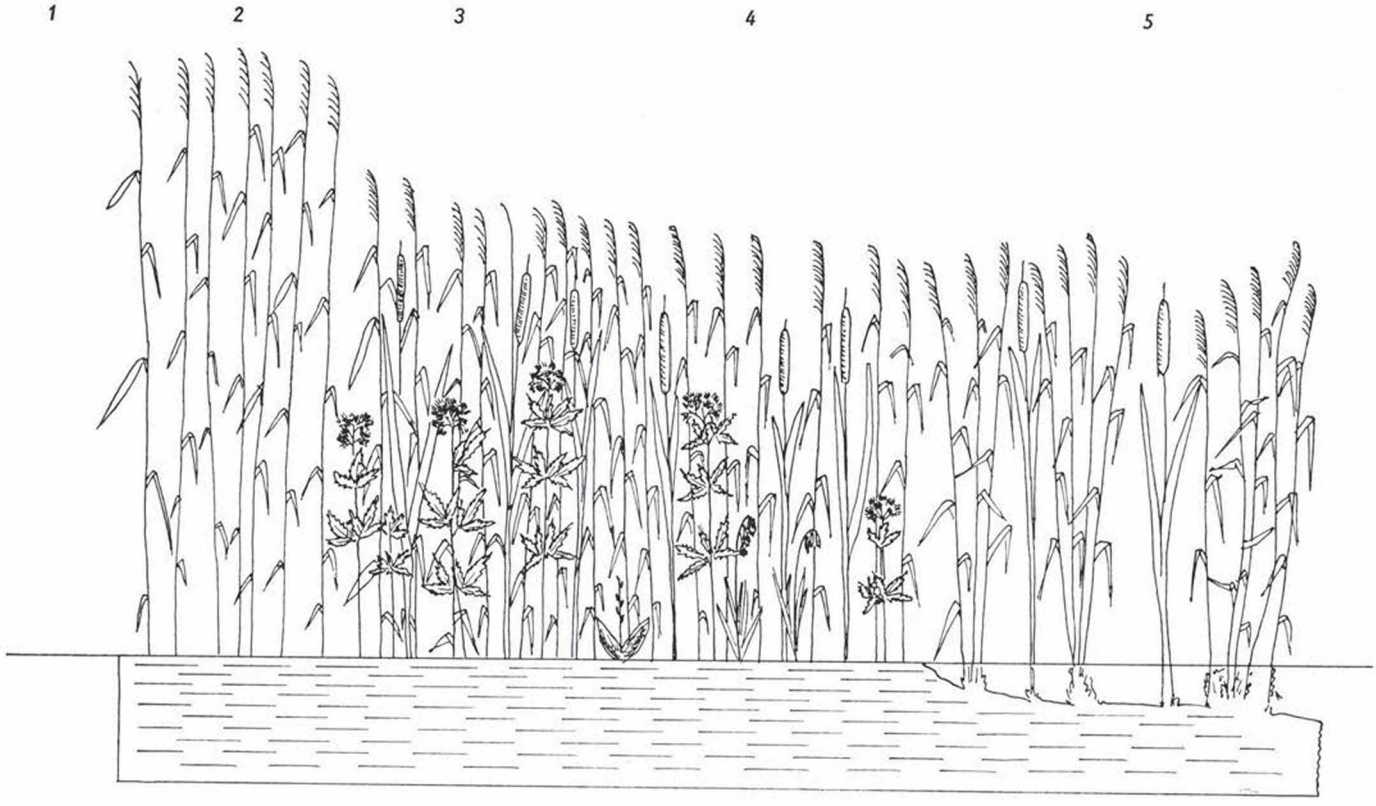

Fig. 3. Cross-section of the sudd at the *Liparis* locality (1 Lángi clearing, 2 sodified "empty" reeds, 3 reeds of rich vegetation bat poor in species, 4 *Liparis* locality, marshy reeds, 5 pond on the surface of the sudd, in it reed in tussocks)

Table I

Synthetic list of the phytocenological surweys

(I. Sodified "empty" reeds, II. Reed zone of rich vegetation but poor in species, III. reed spot of the relict marsh.)

	A–D	K	A–D	K	A–D	K
Phragmites communis	4–5	V	3–5	V	3–5	V
Typha angustifolia	+–1	II	1–4	V	1–4	V
Agrostis alba	+–3	III	+–3	IV	+–3	IV
Calystegia sepium	+–3	IV	+–4	V	+–3	IV
Drepanocladus aduncus	+–2	II	+	II	+–1	III
Eupatorium cannabinum	+–1	II	2–4	IV	2–4.	IV
Lycopus europaeus	+	I	+–1	III	+–2	IV
Rumex hydrolapathum	+	+	+	+	+–1	I
Solanum dulcamara	+–2	II	+–2	IV	+–2	IV
Mentha aquatica	+	+	+–1	II	+–2	II
Sonchus oleraceus	–	–	+	I	+	I
Aster tripolium ssp. pannonicus	+	I	–	–	–	–
Atriplex hastata	+	+	–	–	–	–
Bolboschoenus maritimus	+–1	I	–	–	–	–
Cirsium brachycephalum	+	+	–	–	–	–
Scutellaria hastifolia	+–2	II	+	+	–	–
Schoenoplectus tabernaemontani	+–1	I	–	–	–	–
Sonchus arvensis	+–1	I	–	–	–	–
Calamagrostis canescens	–	–	–	–	+–2	IV
Carex pseudocyperus	–	–	–	–	+–1	III
Liparis loeselii	–	–	–	–	+–1	II
Scutellaria galericulata	–	–	–	–	+–1	III

in the shallow watery mud) very much *Utricularia vulgaris* live. Such spots cab be found on the lake's sudds in many places.

More to the east from here – northward from the Hosszú clearing – similar zonation can be found on the sudds, but going eastward, the "empty" bordering zone becomes more and more wide (five to eight meters), the next "richer" reed-zone is increasingly poorer in species and the marshy reed-zone is absent.

Finally east from the Agárd area the whole surface of the sudds are sodified. On their soil we find the saline species already in much larger cover and steadiness

We may hence establish that the process of the salinization commenced in the easter basin of the lake and is expanding from the east to the west. The reason of this is that teh eastern basin of Lake Velencei practically has no outlet and the amount of precipitation falling onto this area is less

than the potential evapotranspiration (the deficiency being yearly 130 mm at Agárd, 170 mm at Velence; see B o r h i d i – B a l o g h 1970). The Dinnyés-Kajtori canal assuring the outflow of the lake takes it source at the western end of the lake in the vicinity of the Császár brook's mouth being the principal water supplier, thus only the newly arrived fresh water leaves the lake, while the water of the outletless eastern basin of the lake steadily concentrates. (Hence a slow salinization process commenced, perhaps prior to the drainage, this increased, accelerated and extended essentially after the drainage, when the shore gerin of the lake got practically entirely sodified, only on the western shore of the lake, in the environs of the Császár brook's mouth exist a few small relict marshy meadow spots [B a l o g h 1969]).

The "reed control works" executed on the lake caused much harm to the marsh world. In the course of these also this reeds was exterminated which separated the slightly sodified water being black from humic acids, transparent to the bottom from the eastern large saline grey waters. Followingly the Hosszú clearing became also a non-transparent, grey, strongly saline water. In addition, it beacme clayey from mud dredging, unattractive to bathing and the clay does not settle out for decades from the saline water. This interference was at least as harmful to the recreation lake than to the natural resources of the marsh world. The trouble is increased by the fact that the S-shaped passage between the Hosszú opening and the Lángi clearing has been straightened and widened. Therefore, when the eastwind blows a long blond chevelure was visible in the not long ago yet transparent black water of the Lángi clearing. (Today this is already also clay-coloured!)

Our data unequivocally prove that in the western basin of Lake Velencei (Lángi clearing, Vendel clearing, Great pond, Rigya, Hosszú clearing etc.) the salinization is recently originated and commenced as a consequence of the artificial interference (drainage). The large scale interventions into the lake's life effected in the recent past (as reed control, bed dredging, connection of regions possessing waters of different qualities etc.) caused that this process accelerates, aggravates before our eyes.

These facts verify also the theory of B a l o g h (1971) according to which the rich marshy vegetation of the sudds in the western basin of Lake Velencei are relicts of periods prior to the drainage.

Our investigations also point out that following the artificial interferences into the lake's life the sudd world of unique value, in the western basin gets sodified, its relict marshy vegetation is degraded before our eyes. An irrefutable evidence for this is the impoverishing marshy vegetation of the *Liparis* provenance locality encircled by the daline ring. The future perspective is warning: the more widening sodifying rings more eastward, the destruction of the marshy vegetation, sodification of the entire sudd. The process itself is comparatively slow; we have time enough to study it. Research work and every possible effort to preserve the marsh world, is a common duty of researchers as well as of the governors of this region. (In case of a default the generations to come will not give an acquittal!)

Summary

During the summer of 1979 authors found on the western part of the large saline waterbodies of Lake Velencei a very interesting phenomenon when studying the saline sudd reeds. On the sudd amidst the Lángi clearing, Hosszú clearing, Nagy pond and Rigya, behind a narrow ring of saline vegetation they found a non-saline reeds of richer vegetation, within it a marshy reed spot, with *Calamagrostis canescens*, *Carex pseudocyperus* and *Liparis loeselii* in it too. (This association on the lake was known only for a few years from the closed sudd world having open waters almost none located westward from saline water bodies!)

Authors conclude from this that:

– the salinization of Lake Velencei is a recent process, a consequence of artificial interferences,

– the salinization process continues even today (the saline marginal zone of the sudds grows in West – East direction, in the center of the sudds not even a poorish presentation of marshy vegetational spots can be found, later on the sudds get sodified in their entire width).

– it is very important to go in studying the phenomenon and to save the sudd vegetation of relict character to be found in the western basin of the lake from the salinization by any price!

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